

National Hydrography Dataset Goals

Fiscal Year 2014-2015-2016

Future Vision

To drive new discoveries in surface water science. The National Geospatial Program will work increasingly to integrate NHD with high resolution elevation data and provide the user community with new integrated products to support science. NHD will provide a geospatial framework that will allow for an increasing number of geospatial data sets to be integrated and cross referenced with surface water. The NHD will maintain current information through a mix of USGS internal expertise and stewardship. NHD will continue to promulgate data with a strong underlying structure of rich attribution that allows for linkage of scientific information, comprehensive flow modeling, and support for scientific investigation.

Strategy and Approach

The NHD is enabled by a strong data structure, a continuous maintenance process through stewardship, linking of scientific information, a data structure that allows for flow analysis, a comprehensive inventory of water surface features, and the integration of related geospatial data. NGP's approach will be to continue to enhance and augment stewardship tools and opportunities as a means of continuously maintaining and improving the NHD. NGP will move strongly in the direction of Hydro-Elevation integration and will investigate and develop integrated products that enhance the utility of both themes. NGP will continue to work within the water community to achieve increased integration of NHD with other data sets.

Objectives for the future are organized into six tracks:

1. Acquisition – To acquire new and improved NHD/WBD data
2. Data Operations – To operate the NHD/WBD program
3. Data Delivery – To delivery hydrography data to customers
4. Hydro-Elevation – To build a integrated hydrography-elevation dataset
5. Linking Observations – To link observations about water to hydrography data
6. Hydrography Integration – To integrate (or assimilate) various themes of hydrography data with the NHD

Acquisition

Continue data acquisition strategy through NHD Stewardship

Fiscal Year 2014, 2015, 2016 - Priority 1

The NHD program is rooted in collaboration and thus the stewardship process for maintaining the data is fundamental to how the program operates. The USGS is the lead agency for hydrography in the U.S. and has an obligation to ensure stewardship is successful. Stewardship will be the primary, although not only, process to acquire new and maintained data, including local resolution data. Some data may be collected in-house. Close coordination and with our partners is an essential component of the equation. This includes advocacy, documentation, training, guidance, assistance, quality assurance, feedback, and communication. Stewardship shall focus on core content as defined by the National Geospatial Program Data Lifecycle Management Plan.

Data Operations

Quality Assure and process updates to acquired stewardship data for NHD

Fiscal Year 2014, 2015, 2016 - Priority 1

The USGS must provide an efficient working process to enable stewards and in-house staff to interact with and edit the NHD and have those edits reflected in the national database in a timely manner defined as 60 days from submittal to delivery. The tools and processes to do this shall be accurate and efficient, serving as a positive driver to encourage participation in stewardship. Data shall pass comprehensive automated checks, meet standards, and be inspected by the POC's. Complete ongoing end-to-end testing planning for and implementation of more comprehensive automated checking augmented by visual spot checking.

Maintain NHD and WBD desktop tools

Fiscal Year 2014, 2015, 2016 - Priority 1

The existing NHD Update Tool, and new WBD edit tool, will need to remain operational for a number of years to come. To make this possible, errors in the software will need to be corrected, as well as adding minor new functionality necessary to make it possible for in-house and steward staff to fully maintain the NHD and WBD. This needs to be integrated into an effective end-to-end editing process so that steward edits are reflected in deliverable data.

Complete a hydrologic generalization capability

Fiscal Year 2014

A capability is necessary to "normalize" the multi-resolution high-resolution NHD to provide consistency of density at 24K and 100K scales and other scales as necessary. A capability shall be fully operational in FY14 and a national coverage at 24K and 100K shall be produced and made deliverable. It is likely that the production of VAA's makes this process very efficient.

Image Update Program

Fiscal Year 2014, 2015, 2016

Some aspects of hydrography tend to change due floods and other seasonality changes, particularly double-line streams in floodplains. To guard against the NHD becoming too dated it is necessary to photo-inspect the NHD for blunders in coverage and make the necessary edits corresponding to a set of standards. This effort will focus on one-third of the nation as defined by the FY15 USTopo schedule.

NHD revision for AK

Fiscal Year 2014, 2015, 2016

The NHD data for Alaska will require some level of effort to improve it for a desired 1:25,000-scale. At a minimum it shall be edited to eliminate blunders and at a maximum it needs to be remapped using IfSAR/LiDAR sources. This work will be done in-house and by stewards. Close coordination with stewards is required. Requirements should be considered from the local customers in Alaska to meet their needs for hydrography within the context of a national program. Particular attention is needed to ensure the right technology is applied to the task. The Randolph Glacier Index data shall be incorporated into the NHD and be maintained as appropriate.

Develop v1 of web edit tools to enhance data maintenance

Fiscal Year 2014

A "next generation" edit tool is needed for the NHD and WBD to operate on the web. This tool shall provide basic functionality for in-house and steward casual users. This needs to be integrated into an effective end-to-end editing process to ensure that stewards edits are reflected in deliverable data.

Develop v2 of web edit tools to enhance data maintenance

Fiscal Year 2014, 2015, 2016

A “second iteration” web edit tool is needed for the NHD and WBD. This tool shall provide functionality needed by intermediate users to update the NHD. This needs to be integrated into an effective end-to-end editing process.

Develop v3 of web edit tools to enhance data maintenance

Fiscal Year 2015, 2016

A “third iteration” web edit tool is needed for the NHD and WBD. This tool shall provide functionality needed by expert users to update the NHD. This needs to be integrated into an effective end-to-end editing process.

Data Delivery

Produce approved staged products for NHD external delivery

Fiscal Year 2014, 2015, 2016

Data delivery is the most critical capability of the hydrography program for unless the data can effectively get into the hands of the broad range of customers, there is no point in everything else that we do. Data delivery in the GIS world is becoming more sophisticated, demanding services in addition to traditional dataset downloads. The delivery strategy must address all skill levels and meet the needs of science and mapping. Data delivery must be fast, efficient, and be usable in the systems used by users.

Develop web site content and produce educational tutorials

Fiscal Year 2014, 2015, 2016

Communication is essential to effectively serving customers. The NHD web site and its content is a primary means of communication with the customer. To date, the NHD web site is a model for geospatial data communication. Every effort shall be made to continue to advance this status and stay one step ahead of the customer to meet their appetite for information. This includes the development of tutorials similar to others produced to help customers apply the NHD and WBD to problem solving and to master the complexities of the NHD and WBD.

Implement NHDLite

Fiscal Year 2014, 2015, 2016

The NHDLite data model has been developed and is ready for full implementation in FY14. National coverage shall be produced and made deliverable by the end of the second quarter in FY14.

Develop a WFS service for NHD

Fiscal Year 2014, 2015, 2016

It is necessary to provide the NHD as a WFS service to meet the advancing practices of GIS for data provided as a service. It appears the current technology is not suitable to deliver the existing NHD, but rather it is likely possible to do this for a stripped down version of the NHD called NHDLite.

Develop feature level metadata tool

Fiscal Year 2014

The NHD has a rich feature level metadata capability, but it is not possible for the majority of NHD users to effectively utilize this information. A desktop tool, such as an ArcMap toolbar, is needed to access and display feature level metadata for intermediate and novice users of the data.

Develop and implement stream tracing and event discovery for the viewer

Fiscal Year 2015

A powerful capability of the NHD is the ability to trace upstream and downstream to interrelate event relationships. A service to do make this easy for customers is needed in The National Map viewer. Technologies to do this have been developed for specific tools and these techniques should be adopted.

Deliver integrated elevation-hydro datasets

Fiscal Year 2016

New integrated hydrography and elevation data made possible by LiDAR and IfSAR sources will have advanced enough at this point to require data delivery techniques.

Hydrography-Elevation

Produce value added attributes for all U.S.

Fiscal Year 2014

The NHD is a network in addition to being a spatial set of data. The construct of the network offers considerable intelligence to the data and makes the NHD highly significant to scientific analysis. The NHDPlus has successfully exploited the power of the network, proving what can be done. The time has come to continue this record of success on the high resolution NHD. Most of the technology exists. It needs to be applied to the high resolution and process the data in as automated a fashion as possible. The network improvement project should make this possible. Where the Network Improvement Project has been completed, Value Added Attributes will be generated using automated methods.

Develop Value Added Attribute Tools

Fiscal Year 2014

Value added attributes will be added to the NHD in FY14. Therefore a tool and process are needed to correctly generate these attributes and add them to the NHD. Tools already exist to do this for the medium-resolution NHD and need to be adapted. VAA's are based on snapshots of the dataset.

Develop techniques for extraction of higher resolution LiDAR/IfSAR-based hydrography data

Fiscal Year 2014, 2015, 2016

LiDAR and IfSAR technology promise to provide a method to produce more accurate hydrography. However the evidence suggests such technology is not mature enough to be effectively used in a production environment. As the lead agency for hydrography in the U.S., the USGS has an obligation to advance the technology as practical to allow it to become an important advancement to hydrography data development. Techniques are needed to analyze topographic surfaces to derive streams, rivers, and lakes and develop into a NHD. This involves both in-house, academia, and industry solutions.

Develop integrated and enhanced hydrography/elevation data model - Ele/Hydro

Fiscal Year 2014, 2015

The integration of hydrography and elevation has much more to do than just alignment. It is possible to create a data model in which the two datasets can become interoperable to create synergy and be more valuable to users. The NHDPlus and ArcHydro are examples of this. It also involves 3-D hydrography and such things as floodplains and channel cross-sections. It also involves hydro-flattening and hydrologically functioning elevation models. It may involve TIN's as well as matrix surfaces. The objective is to be knowledgeable about these subjects to pioneer new development and position the USGS as a leader in geospatial database development related to hydrography and elevation data.

Develop integrated drainage catchments

Fiscal Year 2015, 2016

The drainage catchment is the true integrated product of hydrography and elevation fusion. It is also the fundamental construct to hydrology enabling rapid drainage area calculations essential in hydrology and as a unit for collecting basin characteristics. The catchment is the logical evolution of geospatial data and is the next step in the path of hydrography and elevation development. The NGP shall adopt existing technologies for catchment production and make them ready to go into production in the

following year. The assumption is that LiDAR/IfSAR will be the basis for this work. This project needs to evaluate and assess the practicality of the technology, costs, etc.

Develop Catchment Tools

Fiscal Year 2014, 2015

Drainage catchments will be generated and added to the high resolution NHD in FY15. A tool and process are needed to correctly generate and add catchments to the NHD. Tools already exist to do this for the medium-resolution NHD and need to be adopted.

Develop improved packaging of integrated hydrography-elevation dataset

Fiscal Year 2015

The development of a new hydrography-elevation data model will lead to the requirements for new packaging techniques to allow for the subsequent delivery of integrated data.

Develop improved periodicity capabilities

Fiscal Year 2015, 2016

The development of VAA's and catchments for the NHD naturally lead to the development of improved periodicity capabilities in the NHD. As hydrologic modeling advances and can take advantage of VAA's and catchments, new periodicity capabilities need to be developed and then implemented.

Linking Observations

Linking SWUDS data for WaterSMART - diversions, water use

Fiscal Year 2014, 2015, 2016

The NHD can be most successful if relevant water information is a part of the dataset. The Site Specific Water Use Data System affords the opportunity to add rich content to the NHD. This is particularly applicable to WaterSMART (water census). (1) SWUDS information shall be added to the NHD to meet the ongoing need of WaterSMART. (2) In addition, added knowledge of water diversion systems shall be added to the NHD since water diversions are essential to the water budget. (3) Springs and wells from SWUDS may provide an important opportunity to improve the NHD and should be added based on an assessment. (4) Other mainstream events such as dams, gaging stations, and water quality monitoring stations shall be maintained. (5) A SWUDS maintenance strategy will be developed and implemented. The NGP will pursue a moderate effort to develop the capability, but any large scale production requires specific WaterSMART funding.

Maintain HEM desktop tool

Fiscal Year 2014, 2015

The Hydrography Event Management Tool desktop version will need to remain operational for a number of years to come. To make this possible, errors discovered in the software as it is tested and used will need to be corrected, as well as adding minor new functionality necessary to make it possible for users to fully produce and edit linear referencing operations on the NHD. The tool also needs to be made part of an overall end-to-end process to achieve objectives for linear referencing.

Develop HEM web tool

Fiscal Year 2014, 2015, 2016

Linear referencing capabilities for the NHD using the Hydrography Event Management Tool need to be made operational for the web to enable a broad range of users to conduct linear referencing operations without dependence on desktop scenarios. The tool will enable a larger cadre of users to do linear referencing by being more accessible. The tool also needs to be made part of an overall end-to-end process to achieve objectives for linear referencing.

Support user community for linking non-NGP events

Fiscal Year 2014, 2015, 2016

The user community response to linear referencing has been overwhelming. Many customers actively use the NHD and the HEM tool to link their own agency-specific events to the NHD. The USGS shall support this work through promotion, training, and assistance of linear referencing. This is to include development of an event clearinghouse for all creators of events.

Hydrography Integration

Develop Wetlands Layer

Fiscal Year 2014

The National Wetlands Inventory is a significant companion dataset to the NHD. It cannot be fully integrated into the NHD since wetlands classifications conflict with NHD classifications, there are temporal differences, and inherent positional accuracy differences. However, that does not preclude the development of NWI into a usable dataset to The National Map and in particular the USTopo. The NGP will transform the NWI into a The National Map wetlands layer, based on the results of the 2012 Madison meeting stating that herbaceous wetlands and woody wetlands will be used by USTopo, as an ancillary dataset to the NHD and which can be distributed as with other The National Map data. NHD Swamp/Marsh will be retained for now.

Complete the conflation capability for NHD

Fiscal Year 2014, 2015

Maintain and update of conflation using in-house or vendor software. An existing and growing trend in NHD maintenance is for users to develop new hydrography geometry that needs update the NHD. Integrating this information is a process for conflation. In-house and vendor tools can facilitate conflation. These tools need to be completed and then maintained and to provide the necessary functionality. They also need to be made part of an overall end-to-end process to achieve objectives for conflated data.

Integrate urban stormwater drainage into the NHD

Fiscal Year 2014, 2015, 2016

Eighty-percent of the U.S. population lives in areas where there essentially is no NHD coverage. That's in urban areas. It is due to the fact that the natural drainage has been re-routed through culvert systems both above and below ground. This has traditionally not been a part of topographic mapping. Yet these drainage systems are as essential to water science as the rest of the NHD is. Efforts shall be made to incorporate the major trunks of urban drainage systems into the NHD. In particular Los Angeles County will serve as a testbed.

Develop integrated hydrography information by incorporating data - other hydro datasets, wetlands, stormwater, floodplains, cross sections

Fiscal Year 2014, 2015, 2016

Hydrography is more than NHD and more than WBD. It is many other datasets dealing with surface water. These primarily concern wetlands, floodplains, and stormwater systems. The NGP shall advance the data models and technologies necessary to better incorporate all forms of hydrography data to become more interoperable and to include more advanced database design.

Groundwater integration

Fiscal Year 2015, 2016

It is inevitable that surface water and groundwater systems will be linked. The NHD/WBD should start understanding the issues involved in this problem and then develop solutions to make this possible. Attention to Springs and Wells in the NHD is a logical place to start.

